WHAT IS CLAIMED IS

1. A process for depositing a metal film on a substrate disposed in a processing chamber, said process comprising:

heating said substrate; and

introducing into, and removing from, said processing chamber, a process gas consisting of a metal source and a hydrogen source to nucleate said substrate with metal while controlling production of a concentration boundary layer by rapidly removing said process gas from said processing chamber after commencement of nucleation of said substrate.

2. The process as recited in claim 1 wherein introducing and removing occurs multiple times to nucleate said substrate with a layer of metal of a desired thickness.

3. The process as recited in claim 1 wherein introducing and removing further includes pressurizing said processing chamber to a first pressure level upon introduction of said process gas and pressurizing said processing chamber to a second pressure level upon removing said process gas, with said first pressure level being greater than said second pressure level.

4. The process as recited in claim 1 wherein introducing and removing further includes introducing a purge gas into said processing chamber to remove said process gas from said processing chamber.

5. The process as recited in claim 1 wherein introducing and removing further includes introducing a purge gas into said processing chamber to remove said process gas while maintaining a pressurization of said processing chamber at a constant level.

6. The process as recited in claim 1 wherein introducing and removing further includes introducing a purge gas into said processing chamber while decreasing a pressurization of said processing chamber.

7. The process as recited in claim 2 wherein introducing said process gas occurs for approximately 3 to five seconds and further including terminating removing said process gas after approximately 7-12 seconds and before repeating systematically introducing into, and removing from, said processing chamber.

8. The process as recited in claim 1 wherein introducing into, and removing from, said processing chamber, defines a nucleation cycle and further including repeating said nucleation cycle multiple times, defining a sequence of nucleation cycles, to form a metal nucleation layer upon said substrate, and varying a ratio of said metal source with respect to said hydrogen source during successive nucleation cycles in said sequence.

9. The process as recited in claim 1 further including forming, after introducing into, and removing from, said processing chamber, a bulk deposition layer of metal.

10. The process as recited in claim 1 wherein said first pressurization is approximately 15 Torr and said second pressurization is in the range of 1 to 3 Torr.

11. The process as recited in claim 1 wherein said metal source is tungsten hexafluoride, WF_6 and said hydrogen source is selected from a group consisting of silane, SiH_4, molecular hydrogen, H_2, and diborane, B_2H_6.

12. The process as recited in claim 1 further including establishing an initial pressurization in said processing chamber, before introducing into, and removing from, said processing chamber, said process gas, with said initial pressurization being greater than said first pressurization.

13. The process as recited in claim 12 wherein establishing said initial pressurization further includes introducing said hydrogen source while establishing said initial pressurization.

14. A process for depositing a metal film on a substrate disposed in a processing chamber, said process comprising:

heating said substrate; and

introducing into, and removing from, said processing chamber, a process gas consisting of a tungsten source and a hydrogen source to nucleate said substrate with tungsten by rapidly removing said process gas from said processing chamber after commencement of nucleation of said substrate with tungsten.

15. The process as recited in claim 14 wherein introducing and removing occurs multiple times to nucleate said substrate with a layer of tungsten of a desired thickness.

16. The process as recited in claim 15 further including forming, after nucleation of said substrate with a layer of tungsten of a desired thickness, a bulk deposition layer of tungsten.

17. The process as recited in claim 16 wherein said tungsten source in tungsten hexafluoride, WF_6 and said hydrogen source being selected from a group consisting of silane, SiH_4, molecular hydrogen, H_2, and diborane, B_2H_6.

18. The process as recited in claim 17 further including establishing an initial pressurization in said processing chamber, before introducing into, and removing from, said processing chamber, said process gas, with said initial pressurization being greater than said first pressurization.

19. The process as recited in claim 18 wherein establishing said initial pressurization further includes introducing said hydrogen source while establishing said initial pressurization.

20. The process as recited in claim 19 wherein introducing and removing further includes pressurizing said processing chamber to a first pressure level upon introduction of said process gas and pressurizing said processing chamber to a second pressure level upon removing said process gas, with said first pressure level being greater than said second pressure level.

21. The process as recited in claim 19 wherein introducing and removing further includes introducing a purge gas into said processing chamber to remove said process gas from said processing chamber.

22. The process as recited in claim 19 wherein introducing and removing further includes introducing a purge gas into said processing chamber to remove said process gas while maintaining a pressurization of said processing chamber at a constant level.

23. The process as recited in claim 19 wherein introducing and removing further includes introducing a purge gas into said processing chamber while decreasing a pressurization of said processing chamber.

24. The process as recited in claim 19 further including repeating nucleating tungsten onto said substrate multiple times to form a nucleation layer tungsten upon said substrate, defining a sequence of nucleation cycles, and varying a ratio of said tungsten source with respect to said hydrogen source during successive nucleation cycles in said sequence.

25. A deposition system for depositing a metal film on a substrate disposed in a processing chamber, said process comprising:

means, in thermal communication with said processing chamber, for heating said substrate; and

means, in fluid communication with said processing chamber, for introducing into, and removing from, said processing chamber, a process gas consisting of a tungsten source and a hydrogen source to nucleate said substrate with tungsten while controlling production of a concentration boundary layer by rapidly removing said process gas from said processing chamber after commencement of nucleation of said substrate.

26. A processing system for a substrate, said system comprising:

a body defining a processing chamber;

a holder, disposed within said processing chamber, to support said substrate;

a gas delivery system in fluid communication with said processing chamber;

a temperature control system in thermal communication with said processing chamber;

a pressure control system in fluid communication with said processing chamber, said pressure control system including a pump having a throttle valve;

a controller in electrical communication with said gas delivery system, said temperature control system, and said pressure control system; and

a memory in data communication with said controller, said memory comprising a computer-readable

medium having a computer-readable program embodied therein, said computer-readable program including a first set of instructions for controlling said temperature control system to heat said substrate, and a second set of instructions to control said gas delivery system and said pressure control system to nucleate tungsten onto said substrate by introducing into, and removing from, said processing chamber, a process gas consisting of a tungsten source and a hydrogen source to nucleate said substrate with tungsten while controlling production of a concentration boundary layer by rapidly removing said process gas from said processing chamber after commencement of nucleation of said substrate.

27. The processing system as recited in claim 25 wherein said computer-readable program further including a third set of instructions to control said gas delivery system and said pressure control system to repeat nucleating tungsten onto said substrate multiple times to form a nucleation layer of tungsten, and a fourth set of instructions to control said pressure control system, sand temperature control system and said gas delivery system to deposit a bulk deposition layer of tungsten adjacent to said nucleation layer.

28. The processing system as recited in claim 26 wherein said computer-readable program includes a third set of instructions to control said gas delivery system and said pressure control system to repeat nucleating tungsten onto said substrate multiple times to form a nucleation layer tungsten, defining a sequence of nucleation cycles, and varying a ratio of said tungsten

source with respect to said hydrogen source during successive nucleation cycles in said sequence.

29. The system as recited in claim 26 said wherein said second set of instructions further includes a subroutine to cause said gas delivery system to introduce said process gas occurs for approximately 3-7 seconds and repeat introducing said process gas to nucleate tungsten onto said substrate 7 to 12 seconds after removing said process gas commences.

30. The system as recited in claim 28 wherein said tungsten source is tungsten hexafluoride, WF_6, and said hydrogen source being selected from a group consisting of silane, SiH_4, molecular hydrogen, H_2, and diborane, B_2H_6.